Remarks

The various parts of the Office Action are discussed below under similar headings.

Claim Objections

Claims 2-6 and 13-16 were objected to on the grounds the preamble "A method" in these claims is inconsistent with the preamble of independent claims 1 and 12. The claims have been amended to recite "The method" instead of --A method--, as suggested by the Examiner and, accordingly, the objections are now believed to be moot.

Claim Rejections - 35 USC 112

Claims 1-6 and 13-16 stand rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. Specifically, the Examiner contends that the language "in a flat or substantially flat shape" raises uncertainties as to what degree the shape of the former has to be flat. Applicant respectfully disagrees. The term "substantially" is a word of approximation which avoids undue limits to the word that it modifies, in this instance "flat". The courts have permitted use of such words. See, e.g., C.E. Equip. Co. v. United States, 13 USPQ.2d 1363 (Ct. Of Cl. 1989); Seattle Box Co. v. Industrial Crating and Packing, 731 F.2d 818, 829 (Fed. Cir. 1984)("substantially"

provides some definitional leeway); Ex parte Wheeler, 163 USPQ 569 (1968). Withdrawal of the rejection is respectfully requested.

Independent Claim 1

Independent claim 1 stands rejected under 35 USC 102(b) as being anticipated by JP60106114 (JP'114).

Claim 1, as amended, recites a method of manufacturing a coil for a magnet, the method comprising the steps of, in sequence: a) manufacturing a former in a flat or substantially flat shape to form a flat shape former; b) bending the flat shape former into a curved shape to form a curved former; and, c) winding at least one electrical conductor around the curved former formed in step (b). The amendment to claim 1, specifying that a winding process is used, is supported by, for example, the first complete paragraph of page 6 of the present application. This refers to ..."the former on which the Z gradient coil is ***wound***..."

JP'114 does not disclose the invention as recited in independent claim 1. JP'114 does not disclose, ***in sequence***, ***bending*** the flat shape former into a curved shape to form a curved former, ***then winding*** at least one electrical conductor around the curved former.

The Examiner contends that the integrated sheet of JP'114 constitutes a former. Nowhere in JP'114 is this stated. The integrated sheet of JP'114 includes the electrodes 2 and 2', respective dielectric green sheets 1 and 1', and a magnetic green sheet 3. The only device that reasonably could be construed as a former in JP'114 is

the core 4. Nowhere is it stated, however, that the core 4 is formed by manufacturing a former in a flat or substantially flat shape to form a flat shape former, and then bending the flat shape former into a curved shape to form a curved former, as is recited in claim 1.

Even if the integrated sheet can somehow be construed to constitute a former as suggested by the Examiner, JP'114 fails to disclose the invention as recited in amended claim 1. Amended claim 1 recites "winding at least one electrical conductor around the curved former." According to JP'114, the outside terminals 7 (which merely act as terminals to allow contact to be made to the electrodes 2, 2' of the inductor) are not ***wound*** around the integrated sheet (which the Examiner contends is a former). Rather, according to JP'114, the outside terminals 7 are formed by a conductor paste of silver-paladium baked on the opposite ends of the main body of the inductor of JP'114. Indeed, the electrodes 2, 2' also are formed using a conductor paste ("... by printing a metallic conductor paste..."). Accordingly, JP'114 relates solely to forming outside terminals and electrodes using a conductor paste, and does not disclose winding of conductors around a curved former.

For at least the foregoing reasons, JP'114 fails to disclose the invention recited in claim 1. Accordingly, it is respectfully requested that the rejection of claim 1, and claims 2-5 depending therefrom, be withdrawn.

Independent claim 12

Independent claim 12 stands rejected under 35 USC 102(b) as being anticipated by JP60106114 (JP'114), and as being anticipated by European Patent Publication 153,131 (EP'131).

Claim 12, as amended, recites a method of manufacturing a coil for a magnet the method comprising the steps of: manufacturing a former from a resilient material to form a resilient former; and disposing an electrical conductor around the resilient former.

Neither JP'114 nor EP'131 disclose manufacturing a former from a resilient material to form a resilient former, as recited in claim 12. The Examiner contends that the integrated sheet taught by JP'114 (what the Examiner construes as a former) "is clearly bent or flexed around core 4 and is certainly capable of returning to its original position of being flat" and "therefore, the former (integrated sheets 1, 1', 3) of JP'114 can be said to be both flexible and resilient."

It is respectfully submitted that the Examiner's assertion is improper for at least the following reasons. It is first noted that although the integrated sheet of JP'114 appears to be flexible to the extent that it can be bent, there is no indication whatsoever in JP'114 that the integrated sheet is capable of returning to its original position; that is, that the integrated sheet is resilient. Indeed, the Examiner has not cited any basis in JP'114 for the assertion that the integrated sheet is resilient. The fact a material can be bent does not mean that it will necessarily be capable of returning to its original shape, or that it is resilient. There are many materials that are flexible and not resilient. For

example, a thin sheet of metal may well be flexible, but it is not resilient since it does not return to its original position after being bent, stretched or compressed. Many materials can be bent, but suffer permanent deformation when they are bent and are not capable of returning to their original shape. There is no disclosure of whether the "dielectric green sheets" 1,1' , the magnetic sheet 3 or the electrodes 2, 2' that make up the integrated sheet in JP'114 are resilient, and many non-resilient dielectric and magnetic materials are known.

With regard to EP'131, the substrate 12 can clearly be bent from a flat sheet into a cylinder and so it is flexible. However, this does not mean that the substrate "is certainly capable of returning to its original position of being flat," as put forth by the Examiner. Furthermore, EP'131 specifically states that the substrate could be a flexible plastics sheet, in particular a flexible epoxy fibreglass sheet. See EP'131, p. 2, lines 20-22. The specification of the present application specifically identifies several problems with fiberglass formers:

> The former is prepared by machining grooves in a ***fiberglass tube***. The tube is then split into four sections, which are glued to the top of the X gradient coils. The Z gradient coils are then wound in the grooves in the ***fiberglass former*** using copper wire or copper bar 42. Figure 3(a) is a side view of such a prior art former 40 showing the grooves 41, and Figure 3(b) is an end view of the former of Figure 3(a).
> To reduce the noise created by the Z gradient coils when they are energised, the grooves 41 in the former 40 are lined with a ***rubber sheet 43***, as shown in Figure 4 which is an enlarged partial sectional view of the former Figure 3(a). The rubber sheet 43 acts as a shock absorber and damps the vibration of the Z gradient coils thereby reducing the maximum acceleration of the coils and the noise generated by the coils in use (the vibrations are caused by the coils moving as a result of the magnetic forces acting on the coils).
> It can therefore be seen that ***the prior art method*** constructing the Z gradient coil is ***expensive***. In particular, the construction of finely machined thin-walled glass-fibre tubes further cut into four sections is ***very costly***. Moreover, two

> winding steps are required after the former has been glued in position: firstly the grooves are lined with the rubber sheet 43 and then, secondly, the copper wire or bar is wound into the rubber lined grooves.

See Specification, page 4, lines 4-25 (emphasis added).

Use of a resilient former eliminates the need to provide a separate resilient lining, as is required in the prior art magnets described in the application (see above). Resilient materials are generally effective at absorbing vibrations, and this is why a resilient former is used in the present invention. The resilient former of the invention absorbs vibrations of the magnet coil, so that vibrations of the magnet coil are not transmitted to other parts of the magnet structure. As is provided in applicants' specification:

> In a preferred embodiment the former is manufactured from a resilient material. This eliminates the need to dispose a rubber layer on the former before winding the conductor....
> ***Use of a resilient former eliminates the need to provide a layer of rubber between the former and conductor.***
> ... since the former is moulded from a flexible, resilient material it is not necessary to line the grooves in the former with the elastic sheet 43, since the former itself will damp the vibrations of the windings. ***The use of an flexible, resilient former thus provides a further simplification of the manufacture of the coil.***

See Specification, page 5, lines 7-9 and lines 13-14, and page 6, lines 15-18 (emphasis added).

For at least the foregoing reasons, JP'114 and EP'131 fail to disclose the invention recited in claim 12. Accordingly, it is respectfully requested that the rejection of claim 12, and claims 13-16 depending therefrom, be withdrawn.

Claim Rejections - 35 USC 103(a)

The claim rejections based on 35 USC 103(a) are moot in view of the foregoing amendments and remarks.

Amended Claim 6

The Examiner indicated that claim 6 would be allowable if rewritten to overcome the rejection(s) under 35 USC 112, second paragraph, set forth in the Office Action and to include all of the limitations of the base claim and any intervening claims. Claim 6 has been amended with the exception of the "flat or substantially flat" language recited therein. As noted above, the use of terms of approximation such as "substantially" is accepted by the courts.

New Claims 21-23

New claims 21-23 have been added. Support for claims 21-23 may be found in applicants' specification at, for example, page 5, line 16, and page 6, lines 22-24.

Conclusion

The claims are believed to be allowable and the application is believed to be in condition for allowance. Prompt indication of same is earnestly solicited. If the Examiner does not believe that the above amendments place the application in condition for allowance, the Examiner is respectfully requested to telephone the undersigned to resolve any outstanding issues.

Should a petition for an Extension of Time be necessary for the timely reply to the outstanding Office Action (or if such a petition has been made and an additional extension is necessary) petition is hereby made and the Commissioner is authorized to charge any fees (including additional claim fees) to Deposit Account No. 18-0988 under Attorney Docket No. MARSP0114US.

Respectfully submitted,
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APPENDIX

Please amend claims 1-6 and 12-16 as follows:

1. (Three Times Amended) A method of manufacturing a coil for a magnet, the method comprising the steps of, in sequence:

a) manufacturing a former in a flat or substantially flat shape to form a flat shape former;

b) bending the flat shape former into a curved shape to form a curved former; and,

c) winding [disposing] at least one electrical conductor around the curved former formed in step (b).

2. (Amended) The [A] method as claimed in claim 1 wherein the former is manufactured from a flexible material.

3. (Twice Amended) The [A] method as claimed in claim 1 wherein the former is manufactured from a resilient material.

4. (Twice Amended) The [A] method as claimed in claim 1 wherein the flat or substantially flat former is formed by moulding.

5. (Twice Amended) The [A] method as claimed in claim 1, further comprising a [the] step of securing the former after the step of bending the former.

6. (Three Times Amended) [A method as claimed in claim 4] A method of manufacturing a coil for a magnet, the method comprising the steps of, in sequence:

a) manufacturing a former in a flat or substantially flat shape to form a flat shape former;

b) bending the flat shape former into a curved shape to form a curved former; and,

c) disposing at least one electrical conductor around the curved former formed in step (b);

wherein the flat or substantially flat former is formed by moulding;

wherein the step of moulding the former includes moulding a groove in the former; and wherein the step of disposing the at least one conductor around the curved former comprises winding the at least one conductor into the groove.

12. (Twice Amended) A method of manufacturing a coil for a magnet the method comprising the steps of: manufacturing a former from a resilient material to

form a resilient former; and disposing an [a hard-wire] electrical conductor around the resilient former.

13. (Amended) The [A] method as claimed in claim 2 wherein the former is manufactured from [for] a resilient material.

14. (Amended) The [A] method as claimed in claim 13 wherein the flat or substantially flat former is formed by moulding.

15. (Amended) The [A] method as claimed in claim 2, further comprising a [the] step of securing the former after the step of bending the former.

16. (Amended) The [A] method as claimed in claim 14, further comprising a [the] step of securing the former after the step of bending the former.

Please add new claims 21-23 as follows:

21. (New) The method as claimed in claim 12, further comprising manufacturing the former from an elastomeric material.

22. (New) The method as claimed in claim 12, further comprising manufacturing the former from a rubber material.

23. (New) The method as claimed in claim 12, further comprising manufacturing the former from a flexible epoxy resin.